

Original Article

Anemia, Depression, and Suicidal Attempts in Women: Is There a Relationship?

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INTRODUCTION

Suicide is a social problem all worldwide. There is variation in the prevalence of suicide at the regional level which shows the importance of continued surveillance for collecting data for prevention and control modalities.^[1] During the last 50 years, mortality from suicide has been shifted from Western to Eastern Europe and to be shifting to Asia now.^[2] It is estimated that the suicide would account for 2.4% of the global burden of disease by 2020 while it was 1.8% in 1998.^[3] In a systematic review by Malakouti *et al.* on the epidemiology of suicide behaviors among

the countries of the eastern Mediterranean region of the World Health Organization, there were distinct differences between different regions which necessitates to explore the different sociocultural and risk factors for suicide.^[4] Mental disorders, including affective disorders, substance abuse, antisocial behaviors, and a history of psychopathology, have been introduced as strong risk factors for suicide commitment among young people.^[5]

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ABSTRACT

Objective: Suicide is a social health problem worldwide. Anemia has been associated with depression. Since it remains debated whether anemia is associated with suicide independently of depression, we evaluate this probable association in women who attempted suicide through acute poisoning. **Methods:** The study design was cross-sectional and performed on women who attempted suicide through intentional poisoning with age more than 18 years old. Different variables were evaluated and compared in patients with respect to anemia, depression, other psychiatric diseases and history of suicide. Independent *t*-tests and binary logistic regression were used for statistical analysis. **Findings:** Nearly 26.2% of the women had anemia ($n = 55$). Most women with anemia were in the age group of 20–40 years (68.8%). 52.2% of the women were married. Mixed-drug poisoning was the most common (60.1%) followed by pesticide (8.9%), and antipsychiatric medications (8.4%). There was a significant difference in duration of hospitalization between anemic and nonanemic patients. Nearly 72.7% of the patients survived without complications. Anemia and depression were not significant predictive factors for depression and suicide. However, in our patients, the presence of other underlying psychiatric disorders was a risk factor for suicidal attempt through acute poisoning. **Conclusion:** In women who attempted suicide through acute poisoning, anemia and depression were not predicting factors for suicide. However, the presence of other underlying psychiatric disorders had a predictive value for the outcome of treatment. Length of hospital stay was also correlated with anemia.

KEYWORDS: *Acute poisoning, anemia, depression, suicide, women*

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Many studies have investigated attempted suicide and correlated factors including age, living alone (loneliness), lack of familial supports, stressful life events, depression, alcoholism, drug abuse, and chronic physical disorders.^[6-10] Depression on the top causes of suicide has been evaluated in many articles. Many predisposing factors have been mentioned for depression which may have also a role in suicide. Anemia is considered as an important factor for depression. Ludwig and Strasser mentioned that the depression is a sign of anemia.^[11] Beard *et al.* showed a close correlation between depression and iron deficiency anemia after pregnancy.^[12] Individuals with a sickle-cell disease may be at risk for depression which has been evaluated in a study by Jenerette *et al.*^[13]

Although the correlation between anemia and depression in one side and depression and suicide in another side is previously shown in many articles; the relationship between anemia and suicide has not been clearly specified yet. In Iran, due to the ease of accessibility for people to some prescription drugs, one of the common ways for suicide is intentional self-poisoning with medications.^[8] Women commit suicidal attempts through acute drug poisoning despite it may have a low chance for death.^[6,8] Considering the fact that women in childbearing ages are normally more vulnerable groups for suicide,^[7] we evaluated the frequency of anemia in women who attempted suicide through acute poisoning and compared different variables in them with respect to presence or absence of anemia. Since it remains debated whether anemia is associated with suicide independently of depression, we also evaluate this association in women who had or had not depressive disorders.

METHODS

This cross-sectional study was performed on poisoned female patients referred to the Clinical Toxicology Department of Noor and Ali-Asghar (PBUH) University medical center, in 2013. The inclusion criteria were women aged 18 years or more who committed suicide through intentional acute poisoning with the ingestion of poisons or medications without a tendency to hemorrhage. Patients who had bleeding during gastric washing, ingestion of medications which may cause gastrointestinal bleeding such as ferrous sulfate, and those who discharged with their own decision were not included in this study. Written informed consent was taken from the patients or their first-degree relatives before participation. The research committee of Isfahan University of Medical Sciences approved the study protocol (Research Project Number 191162).

After the admission of patients, they were medically managed by attending physicians. Simultaneously,

their blood sample was taken by a nurse practitioner for checking complete blood count (CBC) as well as other necessary laboratory tests. Patients' clinical and demographic details were recorded, and after their clinical recovery, patients' mental health was assessed by a clinical psychologist and/or a psychiatrist.

The recorded details included demographic factors, history of previous suicide, job, educational level, married situation, economy situation, divorce of parents, number of children, history of addiction, alcoholism, history of addiction in family, history of hospital admission for an acute psychiatric status in patient or her first-degree relatives (family), living alone, physical disorder, as well as the results of CBC tests. Based on the CBC results, patients were divided into two groups: patients with and without anemia. Anemia was defined as blood hemoglobin (Hb) level under 12 mg/ml.

The data were analyzed using SPSS Statistics for Windows, Version 17.0, Chicago, USA. Independent *t*-tests, Chi-square or Fisher's exact tests, Spearman or Pearson correlation tests, and binary logistic regression analysis were used for comparison between groups, relationship, and predicting variables, respectively. $P < 0.05$ was considered as a statistically significant difference. The results were presented as mean (standard deviation) or number (%) where applicable.

RESULTS

From a total of 384 screened women with a suicide attempt who were admitted to the hospital, 209 poisoned patients were eligible for recruiting for the study and had the inclusion criteria. 26.2% of the women had anemia. The route of suicide was ingestion in all women. Nearly 52.2% were married, 33% single, 1.9% divorced, 1% widow; and 11.9% had an unknown history of marriage. Nearly 15.8% of women had a high-school diploma or less. Nearly 5.3% of these women were addicts as well.

Most of the women with anemia were in the age group of 20–40 years (68.8%). Mean ages of women were 31.33 ± 12.25 years. In Table 1, the frequency distribution of women with and without anemia with respect to age groups is shown. There were no statistically significant differences in this regard ($P = 0.51$).

Nearly 30.3% of the studied women had committed suicide for more than once. However, there was no significant difference between anemic and nonanemic patients regarding to the frequency of suicidal attempt. Women were also evaluated for the presence of depression, other active psychiatric disorders, history of suicide through acute poisoning, or other routes for suicide. There was no statistically significant difference

between women with and without anemia with respect to their different recorded psychiatric status [Table 2].

Mixed-drug poisoning was the most common (60.1%) cause of poisoning followed by pesticides (8.9%) and antidepressants or antipsychotic medications (8.4%) [Table 3].

In our poisoned patients, anemia was not statistically correlated with the presence of depression and commitment of suicide. However, it was correlated with economic situation ($P = 0.0001$) and family psychiatric disorder ($P = 0.01$). The average length of hospital stay for our patients was 20.10 ± 5.14 h, and there was a statistically significant difference in the duration of hospitalization between patients with and without anemia (17.48 ± 5.18 ; and 12.28 ± 3.20 ; $P = 0.01$). Length of hospital stay was correlated with anemia ($P = 0.01$).

Binary backward stepwise logistic regressions were performed for suicide predicting factors. Depression was not a significant predicting factor for suicide through acute poisoning ($P = 0.96$) or other routes of suicide ($P = 0.66$); however, the presence of other psychiatric disorders was a risk factor for suicide through acute poisoning ($P = 0.005$; odds ratio [OR], 5.21, 95% confidence interval [CI] 1.64–16.51) as well as other routes of suicide ($P = 0.0001$, OR 4.17; 95% CI 2.04–8.51). Anemia was not a risk factor for

depression ($P = 0.76$) or suicide through intentional poisoning ($P = 0.59$). Most of the patients survived without complications (72.7%). There was not a significant difference in the outcome of women with and without anemia ($P = 0.77$) [Table 4]. Anemia, depression, and the presence of another psychiatric problems were not predicting factors for the patients' treatment outcome ($P = 0.58, 0.70, \text{ and } 0.21$, respectively).

DISCUSSION

The aim of our study was to determine whether anemia is associated with suicide disregarding the presence of depression. Therefore, we evaluated this probable association in women who attempted suicide through intentional poisoning. The prevalence of suicide attempts is previously reported higher in women than men in a meta-analysis of Simon *et al.* on the evaluation of the prevalence of suicidal ideation and suicide attempts in the Chinese aging populations.^[14]

Our result indicates that 26.2% of women with suicide suffered from anemia. Li *et al.* investigated women for studying the correlation between sex and the level of iron in the blood. They did not find any correlation between gender and anemia.^[15] Low baseline Hb strongly predicted the presence of depression in older men, but not in women.^[16]

All women in our study committed suicide through the ingestion route which may be due to a simple, painless

Table 1: Relevant frequency of anemia in women who committed suicide with respect to age

Age group (years)	Patients committed suicide		P
	Anemic (n=55) (%)	Non-anemic (n=154) (%)	
<20	13.4	9.4	0.51*NS
21-40	65.8	77.4	
41-60	18.1	11.3	
>60	2.7	1.9	
Mean ages±SD	31.69±12.8	30.30±10.7	0.48**NS

*Chi square test, **Independent t-test, NSNot significant between groups. SD=Standard deviation

Table 2: Comparison of the psychiatric disorders in the studied women with respect to anemia

Patients' psychiatric status	Patients committed suicide		P
	Anemic (n=55) (%)	Non-anemic (n=154) (%)	
Presence of depression	21.7	19.5	0.76
Presence of other active psychiatric disorders	33.6	43.5	0.22
History of previous suicidal attempt (by nonpoisoning routes)	27	41	0.09
History of previous suicidal attempt (by poisoning route)	9.5	12.5	0.58

Table 3: Frequency distribution of ingested toxic agents in studied patients with respect to anemia

Toxic agent	Patients committed suicide		P
	Anemic (n=55) (%)	Non-anemic (n=154) (%)	
Benzodiazepines	11	2	0.26*
Opioids or stimulants or hallucinogens	2	0	
Antidepressants or antipsychotics	14	3	
Pain relievers	13	1	
Pesticides	15	3	
Other medications	14	2	
Mixed drugs	83	39	
Unknown medications	4	0	

*Fisher's exact test

Table 4: Treatment outcomes of the studied patients with respect to anemia

Outcome	Patients committed suicide		P
	Anemic (%)	Non-anemic (%)	
Survived without complications	69.8	73.7	0.77*
Survived with complications	24.5	21.2	
Death	5.7	5.1	

*Chi-square test

and inexpensive route of suicide. Nearly 37.3% of them had a history of addiction. Foster *et al.* showed that the risk of suicide in young women who used hashish was more than men.^[17] The mean age of women was 31.33 ± 12.25 years. Nearly 68.8% of them with anemia were in 21–40 age groups, which is compatible with the childbearing age of patients. Beard *et al.* in his study showed a correlation between depression and anemia in postpartum patients. Although we did not evaluate the type of anemia, inadequate amount of iron and folic acid in the diet may have a role in their anemia.^[12]

Nearly 21.2% of women in our study had depression. 19.5% of women had depression with anemia. Corrao *et al.* in a retrospective study on hospitalized patients showed women suffered from depression more than men.^[18] We did not find a significant correlation between anemia and depression. Similar to our result, no association between depressive disorders and anemia status was found in a study reported by Lever-van Milligen *et al.*^[19] However, anemia was associated with depression in older adults.^[20] In addition, a strong association between depression and anemia is proposed in healthy adults from the general population.^[21] Alharbi and Abdulghani announced that reduction in Hb level is a risk factor for postpartum depression in women.^[22] Pamuk in a case–control study indicated that patient with anemia more than patient without anemia can develop major depression.^[23] In some studies, the role of some nutrients has been proposed. Ramaekers mentioned that folic acid can provide sufficient folate for brain and can reduce the autoantibody titration against folate receptor, with that can remove mental disorder.^[24] Depressive patients may have low folate and low Vitamin B12 status, and oral doses of both folic acid and Vitamin B12 have been suggested to be given to these patients to improve depression.^[25] In a randomized, clinical trial study, depressive symptoms have been improved in patients receiving Vitamin B12 supplementation with antidepressants.^[26] The efficacy of early iron supplementation on postpartum depression has been reported in the study by Sheikh *et al.*^[27] Wallen *et al.*, who reported a study on patients with sickle cell anemia indicated that 21% of them getting depression.^[28] Shafiee *et al.* found that depression in thalamic patients was significant.^[29] In addition, Wang *et al.* in an animal study reported behavioral and cognitive disorder in a mouse with sickle-cell anemia due to severe pathological changes in the cerebellum and hippocampus.^[30] The difference of our study with others may be due to the difference in the ages of the evaluated patients and the design type of our study. As we have evaluated only female patients, who attempted suicide while in other studies patients including both genders with depression had been evaluated. In addition, we did not evaluate

the type of anemia, while in the previous studies, the correlation between anemia and depression was more common in patient with a low level of B12 and acid, folic and patients with sickle-cell anemia. Similar to our results, Jonassaint *et al.* in a systematic review study did not find a significant relationship between depression and sickle cell anemia.^[31]

Although in previous studies, the correlation between anemia and depression and a correlation between depression and suicide had been determined, we did not find any significant differences in frequency of depression in suicide patients between patients with and without anemia which may indicate that suicide may be happening in patients with anemia without depression. Our result, in this case, is in accordance with the study of Singhal *et al.* In their review article, they showed the correlation between epilepsy, asthma, migraine, psoriasis, diabetes mellitus, eczema, inflammatory problems with suicide; however, they did not show any correlation between anemia and suicide.^[32]

In our study, 72.7% of women discharged without any complications, and the average length of hospitalization was <24 h which may show the less significant toxicity in women who attempted suicide. There was a significant difference in the duration of hospitalization between patients with and without anemia. Length of hospital stay was correlated with anemia which shows the need for paying extra and special attention to anemia in patients who attempted suicide.

It is concluded that in women who attempted suicide through acute poisoning, the presence of an active psychiatric disorder is statistically correlated with the occurrence of suicide. However, depression and anemia were not correlated with the commitment of suicide.

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AUTHORS' CONTRIBUTION

NEM presented the idea and designed the study, SB and MS gathered the data under scientific supervision of AY, NEM, AMS, PP, and RA drafted the manuscript. All authors contributed in scientific revisions, data analysis, and approved the final version of the manuscript.

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Conflicts of interest

There are no conflicts of interest.

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